

REMARKS

Claims 1-21 are pending in the application. Favorable reconsideration in light of the remarks which follow is respectfully requested.

The Obviousness Rejection

Claims 1-21 have been rejected under 35 U.S.C. § 103(a) over Hoppe et al (U.S. Patent 6,570,657) in view of Naya (U.S. Patent 5,917,607), the specification, and Verber et al (U.S. Patent 4,394,060).

Hoppe et al relates to an arrangement for surface plasmon resonance (SPR) spectroscopy. Broadband light is sent through a fiber, into a collimator, and then through a prism and onto the bottom of a sample cell. Reflected light travels through the prism, another collimator and fiber, and finally into a polychromator. The advance involves the use of a diaphragm between the collimator and prism on the front end to split up light to different areas. Hoppe et al does not employ an optical integrated circuit in its SPR arrangement.

Naya relates to an SPR system involving directing light into a prism to a sample, and detecting light intensities with a CCD, for example. Naya does not employ an optical integrated circuit in its SPR system.

Verber et al relates to a light beam scanning system for scanning laser light through an optical waveguide. Light generated by a diode laser is sent via a waveguide through a collimator and surface acoustic wave, a prism-coupler, and then an imaging lens. Verber et al does not mention SPR devices or techniques. Verber et al does not mention, teach, or suggest an AWG spectrometer.

The Examiner contends that it would have been obvious to use the light beam scanning system of Verber et al as a scanner in the devices of Hoppe et al and Naya. Applicants respectfully disagree.

One Skilled in the Art Would Not Have Combine the Art as Alleged by the Examiner

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). There is no teaching or suggestion that the light beam scanning system of Verber et al can be used in the devices of Hoppe et al and Naya. Verber et al makes no mention of SPR systems while Hoppe et al and Naya make no mention nor make any motivation to employ an optical integrated circuit therein.

The claimed use of an optical integrated component in an SPR system, for example, to scan multiple sample regions is more intricate than mere selection of an alternative scanning method. The ability for conventional SPR systems to make repeatably accurate measurements is limited by their reliance on varying the geometry of the optical probe and being able to accurately repeat those geometrical relationships from measurement-to-measurement and location-to-location.

Overcoming this limitation, one of the possible advantages provided by the subject invention is using is that the optical input port for each sample location can be fixed at a single point determined by a physical aperture form the integrated optic component, either the waveguide end faces, which are located with sub-micron accuracy by the photolithography used to produce the integrated optical chip, or the fiber-array endface, which can also have the endfaces located to sub-micron photolithographic accuracy by for instance by bonding in a silicon v-groove array or in a single-mode multi-fiber connector (both common ways of terminating the fibers in a multi-channel integrated-optic device).

There is not teaching or suggestion in any of Verber et al, Hoppe et al, and Naya that the scanning device of Verber et al would improve the SPR method of Hoppe et al and/or Naya. Thus, there would have been no motivation for one skilled in the art to incorporate the scanning device of Verber et al into the SPR systems of Hoppe et al and/or Naya.

Although Applicants do not concede that one skilled in the art would combine Verber et al, Hoppe et al and/or Naya, it is noted that the alleged combination is insufficient for two important reasons. First, the scanner of Verber et al does not have a channelized output. The waveguide in the scanner of Verber et al extends across the substrate width and contains non-channelized light. Second, the scanner of Verber et al contains/requires an unguided section through a free-space lens to form the output aperture. This free space is outside the scanning substrate and is consequently subject to mechanical instability. Non-channelized light and the mechanical instability of free space optics means that the scanner of Verber et al has variable geometry and it does not achieve accuracy and repeatability. Given the inability to provide channelized light and the mechanical instability concerns, one skilled in the art would not incorporate Verber et al into the SPR systems of Hoppe et al and/or Naya. Withdrawal of the rejection is therefore respectfully requested.

Further Clarification Requested if Rejection Is Retained

If the Examiner retains his position on this rejection, then the Examiner is requested to specifically describe how the scanning system of Verber et al would be incorporated into the SPR device of Hoppe et al. In other words, how would the elements of Verber et al and Hoppe et al function/work together?

The AWG Spectrometer Mentioned in the Specification

The Examiner contends that it would have been obvious to use the AWG spectrometer of the subject specification (not described in the Background section) in place of the spectrometer of Hoppe et al. Applicants again respectfully disagree.

There is no teaching or suggestion in the cited art to use an AWG spectrometer in an SPR system/method generally, and specifically there is no teaching or suggestion in the cited art to use an AWG as a spectrometer. This is more fully explained below.

Generally speaking, a spectrometer is a device used for measuring wavelengths of light spectra. That is, a spectrometer is a device for detecting and analyzing

wavelengths of electromagnetic radiation, and more broadly, any of various instruments in which an emission (for example, electromagnetic radiation) is spread out according to some property (for example, energy) into a spectrum and measurements are made at points or regions along the spectrum.

There is no basis for the Examiner's implication that an arrayed waveguide grating spectrometer is a spectrometer that is known in the art. The implication is made because there is no teaching or suggestion in the cited art to employ an OIC or AWG as a spectrometer. The primary function of an AWG filter is to isolate or combine multiple optical communications signals occurring in discreet wavelength bands. The cited art does not recognize to use such a device for spectroscopic analysis across a continuous range of wavelengths (i.e., as a spectrometer). One of many features of the subject invention is using an integrated AWG spectrometer to eliminate the mechanical stability issues affecting repeatability in conventional SPR methods, hence markedly improving sample-to-sample accuracy of SPR measurements made in accordance with certain aspects of the subject invention.

Using an AWG as a spectrometer within the subject invention involves interpreting the information collected by the claimed systems and methods using the AWG to collect the information. The spectrometer aspect of the AWG is created when the data captured by the AWG is analyzed. In this connection, Applicants have adequately described how to make and use an AWG spectrometer. As described in claim 2, employing an AWG as a spectrometer in an SPR system is one of many novel aspects of the subject invention.

Petition for Extension of Time

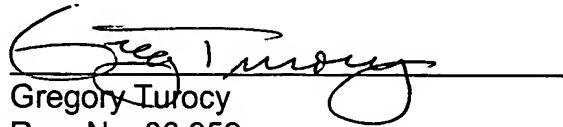
A request for a one month extension of time is hereby made (small entity status has been established). The Commissioner is authorized to charge the fees for the One Month Petition to our Deposit Account No. 50-1063.

Should the Examiner believe that a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

In the event any fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to our Deposit Account No. 50-1063.

Respectfully submitted,

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